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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/667,384	09/23/2003	Dante Patrick Bonaquist	D-21372	1936
7590	01/26/2005		EXAMINER LEUNG, RICHARD L	
PRAXAIR, INC. LAW DEPT.- M1 557 39 OLD RIDGEBURY ROAD DANBURY, CT 06810			ART UNIT 3744	PAPER NUMBER

DATE MAILED: 01/26/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/667,384

Applicant(s)

BONAQUIST ET AL.

Examiner

Richard L. Leung

Art Unit

3744

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 23 December 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 5-11 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 5-11 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date 09-23-03.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

Election/Restrictions

1. Applicants' election without traverse of claims 5-11 and cancellation of non-elected claims 1-4 in the reply filed on 23 December 2004 is acknowledged.

Claim Rejections - 35 USC § 103

2. Claims 5-11 are rejected under 35 U.S.C. 103(a) as being unpatentable over US 5308382 (Prasad) in view of US 6442949 B1 (Laskaris et al.). Please note that minus any clear definition in the Applicants' disclosure, the "gas contaminant cleaning system" recited in the claims is understood in light of the specification as being a means for combining the gas stream from the storage space with gas from the purge gas generator.

Regarding claim 5, Prasad discloses a system comprising a storage unit having a storage space 3, a purge gas generator 1 and 2, a means 5 for passing gas from the purge gas generator 1 into the storage space 3, a gas contaminant cleaning system wherein a portion of the gas from the storage space 3 is combined with gas from the purge gas generator 1 (column 5, lines 25-31) and a means 9 and 10 for passing gas from within the storage space 3 to the gas contaminant cleaning system. See particularly Figure 2. Prasad fails to disclose a cryocooler having a cold head, means for passing gas from the purge gas generator to the cold head of the cryocooler, and means for passing fluid from the cold head of the cryocooler into the storage space 3. Laskaris et al. teach a refrigeration system wherein a cooling fluid is passed to the cold head 56 of a cryocooler in order to cool the cooling fluid to cryogenic temperatures

(column 5, lines 60-67). The cooling fluid is then passed to a device to enable cooling of the device. It would have been obvious to one of ordinary skill in the art at the time the invention was made to have provided a cryocooler (cold head) in the system disclosed by Prasad, particularly on line 5, in the manner taught by Laskaris et al. in order to cool the gas entering the storage space and produce a cold storage environment that could be used, for example, to preserve perishables or house devices requiring cryogenic temperatures.

Regarding claim 6, by placing the cryocooler cold head taught by Laskaris et al. on line 5 of the system disclosed by Prasad as discussed above, the means for passing gas from the purge gas generator to the cold head of the cryocooler includes the gas contaminant cleaning system.

Regarding claim 7, Prasad fails to disclose that the gas contaminant cleaning system comprises an ejector. Laskaris et al. further teach the use of such an ejector 90 that combines a portion of the used cooling fluid from return line 66 with the stream of cooling fluid in 62 to produce a combined stream that is subsequently passed to the cold head 56 of the cryocooler (column 8, lines 44-54 and Figs. 4 and 5). It would have been obvious to one of ordinary skill in the art to have further modified the system disclosed by Prasad to use the ejector taught by Laskaris et al. in the gas contaminant cleaning system because the ejector would allow for thorough mixing of the gases and Laskaris et al. further teach that use of an ejector could reduce the size of the system compressor (column 9, lines 54-56).

Regarding claims 8 and 9, Prasad discloses that the purge gas generator comprises an air compressor 2 and an air cleaning system 1, and that the air cleaning system 1 may comprise a membrane nitrogen generator. See column 3.

Regarding claim 10, Prasad fails to disclose a heat exchanger wherein the means for passing gas from the purge gas generator to the cold head of the cryocooler includes the heat exchanger, and the means for passing gas from within the storage space to the gas contaminant cleaning system includes the heat exchanger. Laskaris et al. further teach a heat exchanger 64 located on line 62 that passes the cooling fluid to the cold head 56 of the cryocooler and line 66 that returns the used cooling fluid, such that the fluids in the separate lines are brought into counter-flow heat exchange relationship, thus enabling the used cooling fluid in line 66 to cool the fluid in line 62 prior to the latter being passed to the cold head 56 (column 5, lines 42-59). It would have been obvious to one of ordinary skill in the art at the time the invention was made to have further modified the system disclosed by Prasad to include the heat exchanger taught by Laskaris et al. in order to place the gas from the purge gas generator in line 5 in heat exchange relationship with the gas returning from the storage space in line 9 such that the coldness of the returning gas is not wasted to the surrounding environment, and such that the gas in line 5 is pre-cooled prior to being passed to the cold head, which would reduce the burden on the cryocooler.

Regarding claim 11, Laskaris et al. disclose that the cryocooler is a pulse tube cryocooler (column 6, lines 15-18). It is inherent that the pulse tube cryocooler comprises a pressure wave generator and a pulse tube containing a working gas for

Art Unit: 3744

receiving the pressure wave from the pressure wave generator, as is already well established in the art.

Conclusion

3. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

US 6477847 B1 (Bonaquist et al.): discloses the use of a pulse tube cryocooler in providing refrigeration to a circulating fluid.

US 6438969 B1 (Laskaris et al.): discloses a refrigeration system comprising a cryocooler, an ejector, and a counter-flow heat exchanger.

US 5003787 (Zlobinsky): discloses a biological refrigeration system comprising a storage unit containing a coolant wherein the coolant is removed from the storage unit, cooled by a refrigeration system, and re-circulated to the storage unit.

4. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Richard L. Leung whose telephone number is 571-272-4811. The examiner can normally be reached on Mon-Fri.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Denise L. Esquivel can be reached on 571-272-4808. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Art Unit: 3744

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Richard L. Leung
Examiner
Art Unit 3744


CHERYL J. TYLER
PRIMARY EXAMINER

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